USDA survey: Trust Territory of the Pacific islands Guam American Samoa

U.S. Department of Agriculture, 1975

FOREWORD

The purpose of this report is a beginning effort to respond to concerns made known to the U. S. Department of Agriculture by the Office of Territorial Affairs of Department of the Interior. The objective of these concerns was directed toward assessing the needs for extending the benefits of several USDA services and programs to enhance the development of agriculture in the several Territories of the Pacific Islands.

The various sections of this report attempt to portray in summary fashion the many observations, references to previous studies, together with discussions with government officials and farm operators during a four-week tour of the islands in February-March 1975.

Prepared by the USDA survey team this report is intended to make available in convenient form a variety of needs of these territories from the U. S. Department of Agriculture.

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TRUST TERRITORY OF THE PACIFIC ISLANDS

Introduction

The Trust Territory of the Pacific Islands (TTPI) is administered by the United States in accordance with a United Nations trusteeship agreement entered into following World War II. The Islands were under Japanese rule from 1914 until the end of World War II. The United States Department of the Interior currently has administrative responsibility for the territory.

When scrutinizing areas for change, either economic or social, it is crucial to look at the people themselves. Community values and customs are the controlling elements in community action. Any work to be contemplated by the United States Department of Agriculture in the Trust Territory will be relatively unsuccessful unless the local characteristics, customs and values of the people are taken into consideration. 1/

Agriculture in the Trust Territory is not like that of any other area of the world. Its 2141 islands are scattered 1300 miles from north to south and more than twice that distance from east to west.

1/ For more detailed information on Micronesian history and customs, see Appendix A.

The islands are inherently poor in natural resources and certain aspects of climate as they relate to most agricultural crops. These deficiencies, coupled with a widely dispersed land area which is less than half the size of Rhode Island, constitute a severe handicap to the production and marketing of commercial agricultural products. Generally, the soils are of low fertility, thin and susceptible to erosion.

Throughout Micronesia, one can find many evidences of soil nutrient deficiencies in the basic nutrients of nitrogen, phosphorous and potassium as well as some minor elements. Soil analysis reports done at the University of Hawaii substantiate this observation. Special attention will be needed to supplying needed phosphate and calcium in many of the areas observed.

Soils examined in several places throughout our visit revealed very deep soils as well as some textures which lend themselves to erosion. Most soils are well drained, at least those we observed on the district center islands, and can be adapted to a wide range of agricultural production provided the use of proper land preparation and suitable farming techniques are followed to maintain fertility. The natural fertility of the soils is closely associated with the condition of the topsoil which rapidly deteriorates unless good soil management programs are used.

The climate of Micronesia is tropical. Temperatures range between 70 and 90 degrees with average for each district hovering around the 80 degree mark. Humidity averages are also in the low 80s. Rainfall is not well distributed, usually being either extremely wet or dry. The rainy season is acknowledged to be May through November. The trade winds that bring rain and cool the humid islands also cause tropical storms which sometimes reach typhoon status. The sea around the Marshall Islands and Truk spawns these dreaded cyclones in late summer and early fall. Many do not encounter the islands but when they do the damage to buildings, homes and agriculture is likely to be extensive. Rainfall averages about 300 inches in the rain forests of Ponape. The atoll islands of the Marshalls are particularly short of water because of the coral - sandy soil. They rely heavily on catchments or cisterns to collect water for human needs. Very little, if any, is available for watering stock or for irrigation of crops. Salt sprays on the narrow atoll islands often cause problems for vegetable crops which are not shielded from the spray by windbreaks planted in a manner to protect crops.

The Marianas and the Marshalls have rainfall in the amounts necessary to support most crops that could be grown. However, dry seasons sometimes cause shortages of water but irrigation could supplant the additional needs. Irrigation systems on Tinian from wells

constructed by Japanese and Americans have demonstrated they can be useful for this purpose and have supplied up to one million gallons per day.

The rainfall in the Marianas influences the kinds and quantities of agricultural output. The variations of rainfall, coupled with the marine climate, have had a measurable effect on agricultural activity throughout Micronesia.

Weed control is a major problem in many areas; insect pests and diseases are a constant menace; and difficulties in pollinating and seed curing of grain crops also reduce total agricultural output.

Despite these limitations, the Trust Territory has a well developed system of traditional subsistence gardening, growing a wide range of root and fruit crops adapted to local conditions. The small gardens and fruit orchards -- mostly adjacent to the settlements and homes -- are worked with minimal tools, usually the traditional digging stick or a long-handled hoe and a large metal bush knife. Few areas can be plowed due to limited space or rugged and stony terrain, though some plowing and extensive discing are practiced in the Marianas, particularly on Tinian and Rota. Limited irrigation and fertilization are done although both have expanded in recent years.

Agricultural area and production data for the TTPI are inadequate. Records are kept of produce being marketed commercially but in most instances little is known about products being grown for subsistence only. All of the district agriculturalists agree that an improved data-gathering system is needed in the TTPI.

Trade data are being compiled on a somewhat fragmented basis. The agricultural division of the TTPI is not well versed on trade compilation procedures and does not have a systematic way of compiling data. Periodic trade data are compiled as provided by the customs office but little breakdown is given. United States and Japanese trade sources must be utilized to obtain recent TTPI trade information on a Standard International Trade Classification basis.

Agricultural Administration [2/]

The agricultural division for the TTPI is under the jurisdiction of the Department of Natural Resources. The TTPI headquarters agricultural staff is located in Saipan, although two members are located in other districts. The agricultural staff in Saipan advises the six district agricultural staffs but has no direct supervision over them.

2/ Current budget and staffing patterns, Appendix B.

Functions of the agricultural division include extension services, plant and animal quarantine, soil and forest conservation, marketing services, farm equipment services, technical guidance and planning for the six districts.

Each district agriculturalist is essentially responsible for carrying out the above functions at the district level. In addition he is also responsible for the operation of a district experiment station for testing, evaluating, and improving methods of production.

There is a wide range of competence of local agricultural officials to direct and implement agricultural programs. Staff members are not necessarily selected for their agricultural knowledge. Many lack the leadership and skills necessary to accomplish improvements needed for agricultural development. This may reflect the low priority that agriculture has in the TTPI. There is also much evidence of lack of cooperation among levels of government to provide needed services and planning for the development of agriculture. For example, District Centers frequently remarked that little support or guidance was readily available from headquarters staff. While evidence of long range planning for agricultural development was almost nil for many years, more attention is now being placed on agricultural needs.

Agricultural Production

All crops commonly found in Micronesia are grown to some degree in other Southeast Asian countries. The high islands of western Micronesia support more crops than do the low lying atolls of the Marshalls. Generally, the major subsistence crops of the TTPI are found in most areas but the significance of each in the local consumption pattern varies widely from place to place. For example, yams are of real importance only in Ponape and Yap. Colocasia taro is most important in Palau and Kusaie. Breadfruit is a staple food plant in Truk and is important in all areas. Pandanus is important mainly in the Marshalls. Coconuts are consumed mainly in the Marshalls, moderately in the Carolines, and are less significant in the Marianas.

Several subsistence crops have become more significant in recent years. Cassava is now a staple in Palau where it competes with taro. Rapid maturing sweet potato varieties are found in all areas except the atoll islands where soil conditions hinder its production. The same is true for bananas except that bananas have also gained prominence in certain well drained areas of the Marshalls. No rice is grown in the TTPI except for a small area in Ponape. But since rice is becoming important in the consumption pattern of most Micronesians and currently ranks first among agricultural imports, increased rice production is being contemplated for the next two years totaling about 250 acres. It has been estimated that a total of 600 acres would

be necessary to provide quantities needed for the remainder of the TTPI. Community gardens would provide additional production potential in the Caroline and Mariana districts.

An estimated 70 percent of the daily caloric intake of the TTPI population is derived from locally produced crops. The percentage is much lower in the district centers where subsistence agriculture is less prevalent and more wage-earning transients are found. Locally produced items remain important in the centers but also included in many diets are imported canned or processed foods such as rice, flour, sugar, canned fish and meats, canned milk, fruits, coffee, tea and carbonated drinks.

Copra Industry

Copra is the only significant agricultural export of the TTPI. In 1974, about 12,000 tons of copra were exported to Japan at a value of $4,000,000. No copra is processed within the territory except for a small pilot plant on Ponape with a capacity of one ton per day. This operation was started by a small farmer cooperative. To many inhabitants of Micronesia, coconut growing represents the only available source of cash income with which to supplement subsistence foods, buy trade goods, and generally upgrade their levels of living. Despite its vital importance, the copra industry in the TTPI is in trouble on three fronts: 1) The world price is low (recently

the supply has caught up with demand and vegetable oils are in surplus which has depressed prices severely; 2) Most of the plantings are old, yields are low and they are well beyond the productive life of the palm; 3) While copra is not the only product derived from the coconut in Micronesia, the other major potential coir fiber, derivable from the husks, is wasted.

Plans are being formulated to construct a $2.5 million copra processing facility on Majuro. Four hundred thousand dollars ($400,000) was appropriated by the Micronesian Congress to begin construction July 1975. They expect to borrow most of the balance of funds needed. The capacity is planned to process 18-20,000 tons annually. If such an industry is to be successful, a comprehensive effort will need to be made in planting new higher yielding varieties, thinning out present coconut plantings, and adapting better cultural practices. Farmers also need special training in preparing quality copra to obtain higher returns. For example, farmers are now penalized for delivering copra with high moisture content. Plans for more frequent "pick ups" of copra on outer islands will be crucial to the successful operation of the copra plant.

Livestock Production

Beef production occurs mainly in the Marianas and more so on Tinian where a commercial herd of 4, 000 head exists. While these are mainly fed on pasture of Tangen Tangen and some supplemental grain feeding, this is considered too costly for their operations. Feed grains currently average about 17 cents per pound delivered from the United States while Australian and New Zealand feed grains of lesser quality are delivered at 11 cents per pound. Storage of grain for feeding purposes is exceedingly difficult under tropical weather conditions. Air conditioned rooms or more suitable methods are not practiced widely. Storage losses are reportedly high in most areas where grain feeding is practiced. For these reasons the potential for large scale beef production is not considered to be feasible at this time. Micronesians generally do not include large quantities of meat in their diets; however, meat consumption has become popular in the Marianas, particularly on Saipan.

Swine production throughout the TTPI is practiced on a small scale but is considered important to most families who celebrate special holidays and observances. In each district the Agricultural Department maintains breeding stock to upgrade local swine production. Feed and transportation costs also deter the commercial expansion of this industry. Marketable pork and beef production should be centered in the Marianas with some small expansion on Ponape and Palau.

RECOMMENDATIONS

Statistical Reporting Service --

Headquarters agricultural staff in Saipan and the District Agriculturalists recognize the need for better agricultural data. Under the present system commercial sales of agricultural products reported probably account for no more than 10 to 15 percent of the total production. District Agricultural Directors expressed a need for forecasting agricultural production based on planting and weather conditions. SRS could be most helpful in supplying assistance for this need.

Extension Service --

The present Extension Service seems to have as its main problem inadequate training and supervision of extension personnel. Local farmers do not have confidence in current staff members and it also appears that extension employees lack confidence in themselves. Many extension personnel have received agricultural training in schools of agriculture either in nearby New Guinea, Philippines or Hawaii. Much of the training is said to be unrelated to the needs of their district. Some are placed in jobs of administration without adequate experience or training.

The College of Tropical Agriculture at the University of Hawaii is probably the best qualified institution in the Pacific area to co-operate with the TTPI for providing needed resources to aid the TTPI in agricultural development. The University of Hawaii has indicated its willingness to participate in such a combined effort. The expertise in tropical agriculture is available as well as the "know how" to work with the people in Micronesia.

It would be most desirable to initiate plans to strengthen their extension programs with the assistance from the USDA and cooperating land-grant colleges. An expression of interest in support of such a plan was voiced by several TTPI officials. Furthermore, there was also indication of financial support to implement these plans.

The extension philosophy and methods common in the progress of U.S. agriculture are not practiced in the TTPI. The USDA survey team strongly felt that extension methods which have served both the United States and other nations could well be adopted in Micronesia for agricultural development.

The administration for agriculture does not pursue adequate planning nor does it have adequate resources for administering and supervising its staff. Funds are limited and consequently a number of inputs needed for the development of agriculture are simply not available.

On Ponape, there was observed to be a more adequate environment for cooperation and development of agriculture. The District Department of Agriculture, the local vocational training at the Ponape Island Central School and the private Ponape Agriculture and Trade School all seemed to be dedicated to the expansion of agriculture. A recent training program designed to increase farmer skills for variety crop production has been instituted with an initial indication of success. Other farmers in the area are becoming interested in this effort and are observing plots of the trainees and asking questions.

Extension work could easily start with such basic educational efforts as:

1. Propagation of plants, soil mixes, seed planting in flats, fertility programs, light and wind control, moisture, rotation, seedbed preparation, seed treatment.

2. Correct use of commercial fertilizer and use of natural fertilizers available on most islands.

3. Operation and particularly maintenance of small mechanical equipment, walking tractors, tillers, spray equipment, etc.

4. Cultural practices for each of the crops grown including rotation, weed control, etc.

5. Terracing, contour plowing, and erosion control are needed -- particularly on the islands of higher elevations.

6. Identification of insects and diseases, control measures and safe handling of pesticide chemicals.

7. Introduction and demonstration of new vegetable crops including demonstrations to help farmers see preferences for their particular soil and environmental needs.

8. Harvesting and grading and packing procedures.

9. Collection, preservation, and drying and storage of seeds.

10. Marketing procedures suited to subsistence farming for small amounts to be sold locally or to nearby islands.

Soil Conservation Service --

Soil surveys, which have resulted in the improvement of agriculture in the United States, do not exist for much of Micronesia. Geology maps are available for portions of the Marianas.

Soil surveys conducted by the Soil Conservation Service would be an excellent way to begin planning for agricultural production. Surveys could be useful and made at different levels of detail depending on the purposes of the survey and the nature of the area. It does not seem necessary to make the same kind of soil surveys on the very steep upland soils where land use will probably remain at low intensity and on gentle sloping low terrace areas favorable for development.

Soil conservation practices such as terracing and contouring were not observed in any of our visits excepting some efforts at the Ponape Agricultural Training School. There was much evidence for such needs in many areas including need for impoundment of water for irrigation needs during the dry seasons and drainage for areas which flood for longer periods in the wet seasons resulting in losses of certain crops. This was particularly evident where taro and vegetable crops were being produced.

Contract arrangements could be possible with the Soil Conservation Service for soil survey needs.

Observations of farm operations throughout our tour of the islands would indicate far more attention should be given in assisting farmers to improve their soil management procedures. Contour farming, construction of dikes, and terraces could prevent serious erosion. The use of commercial fertilizer, which is becoming more expensive, is not widely used. Those who use commercial fertilizer have little knowledge of how or when it should be used. For example, one farmer reported the use of 80 pounds of fertilizer for only 100 cucumber plants with discouraging results! Many plantings are burned and several plantings of vegetables appeared to have deficiencies in both major and minor elements.

Forest Service --

The present forestry and conservation sections are part of the agricultural division and formulate policies and plans for forestry and conservation of natural resources. The District Forester is located on Ponape where most of the forestry activity takes place.

The TTPI is a large importer of forest products. Long-term plans are being activated to enable the TTPI to be less dependent on foreign supplies of forest products.

On Ponape, the forestry program at the Metalanim Forestry Station is the primary center for forestry activity in the TTPI. Nursery techniques are being established for promising local timber species. These include Kallock, Pallakigum, Mahogany, Teak, Narra, Eucalyptus, Monkey Pod, Cigar box cedar, Ptropeters.

Forest seedlings of promising species are being distributed for use on public and private lands. This program, however, appears to be approaching the initial stages of development.

Frequently mentioned by agricultural officials was the common practice of burning forested areas for land clearing for subsistence farming. Most of this practice occurred during the dry seasons.

The forestry program, in general, is no where near adequate to have an immediate impact on the internal needs of the islanders.

Assistance by USDA's Forest Service would be considered crucial to the successful implementation of forestry programs to meet the long term needs of the Trust Territory.

Farmers Home Administration --

At the request of FmHA, we attempted to gather information contained in questionnaires on the following areas of concern: 1) Condition of housing, 2) Availability of credit from private lenders, 3) Type and cost of housing, 4) Government housing agencies, 5) Availability of contractors and building materials. The results gathered are being forwarded to Mark Nestle of FmHA for their analysis.

Our general impressions of housing conditions were observed only in government district centers. Serious typhoons which visit Micronesia occasionally have devastated a large percentage of residential homes. Higher quality, western style homes are generally replacing less costly native type housing. The replacement of substandard homes is gradual although some progress is being made.

The high cost of building materials and shortage of available contractors deter a more rapid rebuilding program.

Both headquarters -- TTPI government and District governments -- expressed interest in the Farmers Home Administration housing programs.

The Farmers Home Administration has recently been authorized to extend its housing programs for the benefit of Guam and Micronesia

and plans are proceeding to implement them in the coming months. It would seem reasonable as a beginning to locate an FmHA office on Guam which is a central location for transportation purposes to service Micronesia.

Animal and Plant Health Inspection Service --

Modern transportation has contributed to the problems of adequate animal and plant quarantine inspection service. Entry of new insects and diseases is reported to be rising.

The melon fly (Dacus cucurbital) and fruit fly eradication programs have been somewhat effective in the Mariana district. Nearby infestations on Guam continue to be a threat to the vegetable and fruit production and prohibit export of these products to other nations, primarily Japan. Japan treats Guam as part of the Mariana group and therefore restricts importation of fresh produce.

The Rhinoceros beetle is a serious pest to the copra industry and has been confined to the Palau district thus far. Controls by sanitation, infectious disease and biological means used for several years have reduced the beetle population in Palau.

The giant African snail continues to be a major pest in the Marianas, Ponape, Truk and Palau, inhibiting commercial and subsistence vegetable crop production resulting in low production returns.

Quarantine inspectors who check incoming and outgoing passenger baggage, freight cargoes on both planes and surface vessels, are not adequately trained to restrict entry of foreign pests and diseases. The University of Hawaii's East-West Center previously trained these inspectors but this service has been terminated.

APHIS presently reviews the TTPI operations twice a year and has arranged for a few staff to be trained as quarantine inspectors at U. S. facilities in Denton, Texas at no cost to the TTPI. Laboratory services of APHIS have also been made available to the TTPI to run residue tests on meats.

The veterinarian on the Saipan staff indicated a further need to have access to an APHIS laboratory for pathological specimens.

Assistance from APHIS in training quarantine inspectors could be most beneficial.

U.S. Agricultural Exports to Trust Territory of the Pacific Islands.
Selected items, 1969-74

SITC	Commodity	1969	1970	1971	1972	1973	1974
				1,000 dollars			
01	MEAT						
0111010	Beef	41	53	69	80	140	219
0114005	Broilers	151	251	253	274	358	368
0114025	Chicken parts	66	19	19	21	86	60
0121040	Pork dried	69	54	106	268	102	9
0138030	Meat and meat products	152	193	254	165	157	788
	Other	181	236	320	577	513	920
	Total	660	806	1,021	1,385	1,356	2,364
04	RICE						
0422070	Rice milled	256	189	168	55	102	240
0421040	Rice husked	81	54	58	---	---	---
0422050	Rice milled	321	226	301	641	320	238
0422060	Rice med. grain	139	294	202	155	1,153	1,941
0460020	Wheat flour	212	175	148	196	443	598
0484010	Bakery products	18	---	---	22	52	40
0488410	Infant food	26	34	28	46	46	94
	Other	33	457	125	63	95	74
	Total	1,086	1,254	1,030	1,178	2,211	3,225

U.S. Agricultural Exports to Trust Territory of the Pacific Islands.
1969-74

SITC		1969	1970	1971	1972	1973	1974
	FOOD			1,000 dollars			
00	Live animals	3	2	2	4	4	12
01	Meat	660	806	1,021	1,385	1,356	2,364
02	Dairy products & eggs	189	197	181	321	547	683
04	Cereals	1,086	1,254	1,030	1,178	2,211	3,225
05	Fruits and vegetables	107	101	167	275	263	441
06	Sugar	113	124	119	127	319	686
07	Coffee, cocoa, tea, spices	110	146	140	221	234	303
08	Animal feed	38	52	62	115	22	7
09	Misc. food prep.	167	178	187	327	291	573
11	BEVERAGES	283	493	423	852	690	901
	AGR'L RAW MATERIALS						
121	Tobacco, unmfg.	---	---	---	---	23	---
21	Hides & skins	---	---	---	---	22	---
22	Oilseeds	---	---	---	---	---	---
231.1	Natural rubber	---	---	---	---	---	---
261-265	Natural fibers	---	---	3	5	4	8
29	Crude animal & veg mat, nes	1	3	3	1	2	1
4	Oils & fats	37	54	199	86	119	139
	TOTAL	2,794	3,410	3,537	4,897	6,107	9,343

G U A M

Introduction

Guam is a U. S. possession and all Guamanians became U. S. citizens in 1950. Of the total 1974 population of about 105,000, an estimated 40,000 consisted of U. S. military personnel and their dependents. With its total land area of 209 square miles, Guam is the largest island of Pacific Territories.

Statistical data relating to Guam are incomplete and unreliable. Per capita income was estimated at about $2800 during 1974 but a 20 percent inflation rate hampered real growth. Agricultural production has been expanding slowly with the most rapid advances occurring in vegetable crops such as cucumbers and tomatoes. However, no reliable production estimates will be available until the 1974 agricultural census data are compiled during mid 1975. Among major agricultural consumption items in Guam, self sufficiency has been attained only in poultry and eggs. Cucumbers have been produced in abundance during the last two years but a significant portion of the retail outlets on Guam grow their own vegetables on the nearby island of Tinian, thereby depriving Guamanian producers the entire market for vegetables.

Because no accurate production data are obtained except for the census which occurs every fifth year, it is not possible to measure the magnitude of marketable surpluses. In 1974 there was a cucumber glut and prices fell commensurately. Farmers have shifted to other crops in order to avoid a similar problem during 1975.

The Department of Commerce compiles trade data on a fiscal year basis but 1972 is the most recent year for which data were compiled. Estimates made during FY 1974 indicate the total value of imports was approximately $200 million -- nearly 10 times that of exports. This reflects a per capita trade deficit of about $1800 and a continually worsening foreign exchange position.

Before acquiring land-grant status in 1972, the University of Guam had only a minor extension program. Currently, two full-time extension agents are being utilized to promote farming in Guam. Traditionally, Guamanians consider farming to be an undesirable occupation, which partially accounts for Guam's poor agricultural base. By providing seed, fertilizer and pesticides, along with several demonstration plots, Guam should gain momentum in its agricultural efforts by the late 1970s.

RECOMMENDATIONS

Statistical Reporting Service --

Both the Guam Department of Agriculture and the University of Guam Extension Service recognize the urgent need for improving agricultural statistics and would welcome assistance from SRS. There are no modern methods employed for collecting data on agricultural production and consequently no reliable data are available to assist farmers in planning production or marketing systems. Additional guidance and possible manpower would assist in a more timely release of trade data currently supplied by Guam's Department of Commerce. This would enhance a more timely appraisal of the current market situation.

Extension Service and Cooperative State Research Service --

The Congress provided land-grant status to the University of Guam in 1972 authorizing the use of funds under the Smith-Lever and Hatch Acts to carry out Cooperative Extension work and provide for an experiment station. The arrangements for these programs with the University of Guam are similar to existing arrangements current in the several states.

During the period in late 1972 through this visit in February-March 1975, the Director, Dr. Wilfred P. Leon Guerrero, has acquired a small staff of eight (8) capable personnel to conduct extension

programs in agriculture, home economics, 4-H and community development. The effort during these past two years has been a gradual transition of previous extension-type responsibilities transferred from the Guam Department of Agriculture to the University.

In discussions with Dr. Leon Guerrero, Director of Extension, and Mr. Frank Augon, newly appointed Director for the Department of Agriculture, efforts are now being planned whereby all extension-type activities will be transferred to the college and a close working relationship of these two organizations will continue to be linked together for the rebuilding of an agricultural industry. Dr. E. V. Smith, formerly Dean of Agriculture, Auburn University, Auburn, Alabama, is under contract to the University of Guam as a consultant to assist in developing the agricultural extension, research and teaching programs at the college.

Discussions with members of the Guam legislature and Lt. Governor Sablan also indicated a new interest in support of agricultural development and supporting financial resources being made available in support of these new efforts.

The University of Guam in its new efforts to develop its own resources for agriculture has also voiced its interest in providing assistance where needed to the agricultural development of Micronesia.

Since Guam plays an important segment as a transportation center and market potential, the linkage with the Marianas would be quite natural. However, some further development at Guam will be necessary before further assistance can be extended to either the Marianas or other districts of Micronesia.

Animal and Plant Health Inspection Service --

The melon fly population on Guam restricts not only the production on Guam but also the TTPI from seeking foreign outlets for produce, particularly in Japan and Hong Kong. The melon fly has not been known to exist in the TTPI but Guam plays an important part in the transportation system of agricultural products to foreign markets. Eradication of the melon fly on Guam and increased training of quarantine specialists would improve the potential for foreign markets, primarily Japan, which has expressed a desire for more fresh fruits and vegetables from Guam and the Marianas. A two-year waiting period is necessary before any exporting of produce can be done.

Soil Conservation Service --

The services of SCS can be effectively utilized on Guam for soil surveys and other technical needs in soil and water conservation to provide a useful basis for land use planning and for enhancing the future development of agriculture.

Farmers Home Administration --

Because Guam has experienced a number of serious typhoons in the past two decades, newly constructed homes have been designed to offset some of these extreme weather conditions which visit the island periodically. Despite the recent improvement of residential homes nearly half of the homes are considered sub-standard according to reports received by the USDA from Guam's Delegate Won Pat.

The 1974 Housing Act permits additional assistance through the Farmers Home Administration. FmHA is now taking the initiative in pursuing plans to provide housing assistance to both Guam and Micronesia.

Forest Service --

A recently enacted Congressional bill authorizes financial and technical assistance to Guam for improving fire control, watershed protection and reforestation. Programs for establishing fire resistant

varieties of trees to help offset the spread of grass fires is now underway. The officials of the government are pleased with the Forest Service program and hope its effectiveness will play an important part in fire control on the island.

AMERICAN SAMOA

Introduction

American Samoa, the only U. S. Territory in the South Pacific, is an unorganized, non-incorporated Territory. It has been under U. S. jurisdiction for 75 years. During all these years agricultural policy for the islands of American Samoa is substantially one which primarily supports self-subsistence agriculture. Since the economy of the area is basically agriculture, more emphasis should be given to encouraging and stimulating agricultural production and marketing. This would include the improvement of food crops, poultry, livestock and the increased development of copra and other exportable crops.

Protection of Samoans against the loss of their family lands is an important policy, not only as regards the economy, but also as it may affect the Samoan "Matai" system[3/]. This policy, now practiced with respect to the Samoan's desire to protect the "Matai" system, also encourages the non-indigenous social concepts that would be beneficial and provides a base for precepts of common humanity and governmental responsibility. Some consideration had been given to a land tax to encourage Samoans to make profitable use of their land.

3/ Titled village family head in the traditional Samoan political system.

Except for the more recently added fish canneries and further development to enhance tourism, there has been little or no other development of the economy. Agriculture is basic and a vital part of the economy and has actually deteriorated for lack of real interest and effective attention. The economy is a patchwork of effort with much of the economy living off itself.

The Samoan government is most interested in receiving benefits through a variety of USDA programs and USDA has expressed a desire to assist agricultural development in Samoa.

The family's communal ownership of land carries important implications for economic growth because laws forbid alienation of Samoan owned land -- 96 percent still family owned. Tangled ownership patterns, often "un-economic" property dimensions, and limited leasing privileges hamper use.

Although most of the land is mountainous and unsuitable for agriculture, a recent report by the Wolfe Management Services indicated that good arable land is estimated to be three to seven times the amount currently under production.

Agricultural Production

Agriculture is a second class occupation and farmers are relatively unimportant in the Samoan social structure. In times past, the Territory was self-sufficient in terms of basic foods; however, rising population and comparative attractiveness of work in the canneries and construction industries and alternative employment opportunities have resulted in greater imports for the satisfaction of primary foodstuff needs.

In recent years, imports of taro, meat products, rice, and sugar have accounted for most of the increase in annual food expenditures and agricultural production has declined during the last decade almost in direct proportion to increasing government expenditures for agriculture.

Much agricultural activity in the Territory is in the hands of inefficient subsistence farmers. The few, small "commercial" farmers on Tutuila average 2-3 acres under cultivation and employ principally Western Samoan and/ Tongan laborers. The gap between acreage under production and the amount that could within 10 years be put to varied and efficient use seriously affect the Territory's balance of trade and leave untapped a potential source of income and employment for its population. Production of copra -- at one time a major agricultural export -- has declined so precipitously that copra exports ceased in 1972.

Farming methods are primitive. The stick and bush knife are the most important farming implements as most of the farmland is not tilled. The people subsist mainly on native foods high in starch content such as bananas, taro, and breadfruit. Their diets are supplemented by citrus fruits, papaya, coconut and other tropical fruits and vegetables. Fish and pork furnish limited amount of protein for their diets. Fresh dairy products are not available. They also use imported foods if families can afford them, but high transportation costs significantly restrict food imports for the bulk of the population.

Studies have been made to ascertain the feasibility of developing beef cattle production in American Samoa. A recent beef project started by the Samoan Department of Agriculture in 1972 currently includes 46 Santa Gertrudis cattle on 35 acres. The most recent 1975 report of the Samoan Department of Agriculture reveals that a 7.4 percent annual return was realized on the project.[4/] Because of large meat imports which exceeded $1.1 million in FY 1974, expanded beef production offers potential development with 1500 to 2000 acres available for this purpose. The red meat component of the diet is increasing annually.

4/ Detailed report of Beef cattle project at Experiment Station 1975, Donn Armstrong.

Production of basic foods is vital to the well being of the population and vital for progress in other areas of the economy. These basic foods cannot be raised in the continental limits of the United States. Potatoes, bread or biscuits can never substitute for taro or breadfruit in the traditional Samoan diet.

Recognizing the restrictions to agricultural development caused by the land tenure system, limited credit availability, and the relatively undesirable position of agriculture among alternative employment opportunities, several steps can be taken to strengthen the future of Samoan agriculture.

RECOMMENDATIONS

Extension Service --

Extension Service programs are operated under Mr. Tauiliili, Director of Agriculture, who is the only member with formal training in agriculture. Much of his training is in economics. He is energetic and is striving to initiate a good program. Most employees of the Department of Agriculture have low capabilities and only possess knowledge gained from local experience. Three contract personnel from New Zealand and the United States are highly trained technicians and are the basic persons relied on for expertise. Unfortunately,

the amount of expertise is insufficient and the present contract staff will terminate shortly because of budget restrictions.

There is an urgent need for technical assistance in all phases of extension work. Certainly a good basic extension program for agriculture, home economics, and 4-H should be considered to complement Samoan desires.

It is recommended that new legislation sponsored by USDA to implement needed training and expertise necessary to assist American Samoa in developing a viable extension service would be most beneficial.

To begin the improvement of extension work it would be desirable to tie such efforts to the present Department of Agriculture rather than to a college as is now practiced in the mainland. The Community College of American Samoa has no strong institutional commitment to the extension function and no resources to provide the leadership. Another alternative could be a contractual arrangement with the University of Hawaii. The University of Hawaii's College of Tropical Agriculture has a strong desire to assist in this part of the world and has the research and extension capabilities to adapt to the types of agriculture and customs that prevail on American Samoa.

Farmers Home Administration --

Agricultural loans are primarily available through the Development Bank of American Samoa. Our discussions with the bank officials revealed very few loans have been processed for agricultural purposes. Those few agricultural loans now currently made are based only upon recommendations by the Department of Agriculture. The bank expressed a willingness to release more funds for agricultural purposes. The bank also indicated 80 percent default rates on loans for all purposes.

FmHA possibly could assist local government in planning for needed loan programs to enable the development of agricultural enterprises. It appears that agricultural loans based on current policy of approval by the Department of Agriculture is an undesirable method for determining loan needs.

Agricultural Education --

Low interest in agriculture is a large factor in not having agricultural education in the public school system. The Director of Education and the President of the Samoa Community College have indicated a desire to include agricultural curricula in both the school system and the community college. Samoans are strong supporters of educational systems but there is no strong effort to include education in support of a need to develop agriculture.

The de-emphasis of agricultural training in the local public education system has a deterrent effect in encouraging young people in pursuing careers in agriculture. There is a critical need for expanding agricultural education, both within the school system and in the extension programs of the Department of Agriculture.

Soil Conservation Service --

Geology maps and some climatic data are available for all the islands. The Director of Agriculture is quite anxious to have soil survey data available but available funds seem to be the problem. A previous assessment done by Dr. J. Melvin Williams, SCS, in 1973, fully supports the need for soil surveys to provide a basis for decisions and the improvement of agriculture. A detailed soil survey was estimated to cost about $75,000 in 1973. Contract arrangements can be made with the Soil Conservation Service for soil surveys.[5/]

Observations on this trip would fully support practices needed for containment of soil erosion and engineering assistance to develop water control systems for some areas that may be suited for rice paddy culture.

5/ Williams, J. Melvin, Letter to Governor Haydon, January 29, 1973. (Appendix C)

Animal and Plant Health Inspection Service -- (Quarantine Service)

The yearly increase of both surface and air transport traffic points to the necessity of an adequate program in plant and animal quarantine. The Director of Agriculture has indicated a need for more adequate pre-departure quarantine inspection service in the Honolulu airport for Pago Pago bound passengers. He also indicated the need for assistance for training quarantine officers in Samoa for more complete protection for the islands against unwanted pests, diseases, and seeds.

Agricultural Research Service --

The Samoan Department of Agriculture has requested assistance from ARS to establish a drying facility for breadfruit and cassava. ARS may also be able to provide guidance on the feasibility of establishing a small copra processing facility.

Statistical Reporting Service --

A solid base of facts is a prerequisite to effective planning for agriculture. Our review of statistical information available from annual reports and other sources indicates most information to be unreliable and inadequate. No data are available on the production of agricultural commodities. The department indicated they were

only able to provide information on those agricultural products that are traded through the government operated farmers' market. The amount said to be channeled through the local farmers' market is only a small fraction of that total produced.

Since no comprehensive measurements of agricultural production exist in American Samoa, the Statistical Reporting Service could provide invaluable assistance in planning this needed effort.

Marketing Services --

Several previous studies of marketing problems strongly suggest further research and development of marketing outlets to benefit the consumer and the farmer. The Samoan Department of Agriculture has specifically requested a survey of potentially exportable products which can be marketed outside of the Territory. An evaluation of the current domestic marketing system to determine more effective and efficient marketing procedures was also requested.

Forest Service --

While eligibility for assistance in forest seedling planting programs is yet to be determined, the Agriculture Department and other government officials are highly interested in initiating such a program to assist in future availability of wood products and commensurate reduction of imports.

Housing --

A single family, detached home dominates the scene while there are significant numbers of large Samoan households occupying more than one house unit -- a basic structure and satellite house. Samoans alleviate overcrowding of the basic house by constructing a supplementary satellite house.

Construction materials are mostly imported and very expensive. Building crews often are imported from Western Samoa for construction purposes.

USDA Assistance to TTPI, Guam and American Samoa

A review of FY 1975 Federal outlays of USDA in selected areas for TTPI, Guam and American Samoa reveals the following expenditures (in thousands of dollars) for USDA agency programs.

Agency & Program	Guam	Am. Samoa	TTPI
Food & Nutrition Service:			
Food Stamp Bonus Coupons	$3,615	--	--
Food Distribution - Other Costs	14	--	26
National School Lunch Program	746	594	--
Non-Food Assistance to Schools	10	1	9
School Breakfast Program	160	242	--
Special Food Svc. Program for Children	6	--	145
State Administrative Expenses	6	9	2
Cooperative State Research Service			
Hatch Act	207	--	--
Extension Service			
Smith-Lever Act	143	--	--
TOTAL	$4,907	846	182

Status of TTPI, Guam and American Samoa

The U. S. Department of the Interior administers TTPI under a trusteeship agreement between the United States and the United Nations Security Council. It also administers Guam as an organized, unincorporated Territory of U.S. under organic legislation which serves the same purpose as do constitutions of States. Guamanians are U. S. citizens. The Department of the Interior administers American Samoa as an unorganized, unincorporated territory of U.S. Its citizens are U. S. nationals and are eligible for U.S. citizenship by living the required time in any State.

In June of 1975, the residents of the Northern Mariana Islands of TTPI voted an approval of a proposal to give up their sovereignty to become a self governing commonwealth of the United States similar to that of Puerto Rico. The Congress must now act on this proposal. If the U. S. Congress approves it is the understanding that it will become effective on or about 1980. With commonwealth status it is expected that federal programs will become authorized much in the same manner as for Puerto Rico.

New Legislation Suggested

Current legislation does not sufficiently provide for the type of USDA assistance readily needed for TTPI or American Samoa. In 1972 the University of Guam was provided land-grant status and now has the advantages of extension and research programs to meet their needs. Recently, Guam also was authorized USDA assistance for improving fire control, watershed protection and reforestation under PL 93-421.

It seems most plausible to extend the benefits of selected USDA services to TTPI and American Samoa to assist in increasing food production through the improvement of subsistence and commercial farming. USDA services and technical knowledge would certainly enhance the economic security of these people.

A more specific piece of legislation is suggested as submitted by the Office of Territorial Affairs, Department of the Interior.

A B I L L [1/]

To authorize Federal agricultural assistance for the territories and possessions of the United States and the Trust Territory of the Pacific Islands and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Secretary of Agriculture is authorized to extend, in his discretion, programs under the jurisdiction of the Department of Agriculture to the territories and possessions of the United States (hereinafter called "territories") and the Trust Territory of the Pacific Islands (hereinafter called "Trust Territory"). The Secretary of Agriculture is authorized to provide for such modification of any such programs extended to the territories and Trust Territory as he deems necessary in order to adapt them to the needs of the respective territory and Trust Territory. Such programs shall be developed in cooperation with the respective governments of the territories and Trust Territory and shall be covered by a memorandum of understanding agreed to by the respective territorial or Trust Territory Government and the Department of Agriculture. (The Secretary of Agriculture may also utilize the agencies, facilities, and employees of the Department of Agriculture and may cooperate with other public agencies and with private organizations and individuals in territories, the Trust Territory and elsewhere.)

1/ Suggested draft of legislation submitted by the Office of Territorial Affairs, U. S. Department of the Interior, that might be considered to make the territories eligible for USDA programs but takes into consideration their unique circumstances and laws.

SEC. 2. There is hereby authorized to be appropriated such sums as may be necessary to carry out the purposes of this Act. Sums appropriated pursuant to this Act may be allocated to such agencies of the Department of Agriculture as are concerned with the administration of programs in the territories and Trust Territory.

THE PEOPLE

The Pacific Island inhabitants have had very little need for shelter and clothing. The sun and the rain, combined with the soil and the ocean, provided simple but adequate food, practically for the picking. A food gathering and subsistence economy placed great value on family or communal support and exchange with practically no need for the trappings and the restrictions of a money-based economy.

From the middle of the 17th Century, first Spain, then Germany, then Japan occupied much of Micronesia up until the end of World War II. During much of that period, particularly during the Japan occupation from 1914 to 1945, agriculture was brought to a relatively high level both in efficiency and in volume. In every case, however, it was done by exploiting the natural resources with little benefit to the Micronesians themselves. In some cases, there developed almost a slave-holder-slave relationship. Labor conscription, assignment of planting and production quotas and land management control were commonly practiced. The Japanese were particularly successful through the practice of re-settling workers from Japan throughout the Marianas, the Palaus and the Carolines. By 1940,

Japanese citizens far outnumbered the local people on most of the islands. Japanese skills, work habits and value systems became the standards simply because these people were in the overwhelming majority.

The Dilemma

Recognizing the differences in values and in life styles of the Polynesians and the Micronesians, we must accept the fact that there will be basic conflicts when a money-based economy is superimposed upon them. The question is asked by many people who travel through the Trust Territory -- "Why try to change them: wouldn't it be better to leave them alone with their simple life?" To begin with we must accept the basic premise that it will be impossible for the island people to remain isolated from the rest of the world. They will inexorably be drawn into a money-based economy no matter what kind of government they have in the future. They will be forced to accept, at least to a degree, the concept of commercial agricultural production.

Recognizing the differences in values and in life styles of the Polynesians and the Micronesians, we must recognize that there will be basic conflicts as they shift to a money-based economy. The United States is not the first to face this dilemma. It apparently is the first, however, to attempt to stimulate organized commercial production

through democratic means. Such a situation requires that the populace be convinced that it is to their advantage to accept this radical departure in their life style.

At the close of World War II, most of the Japanese left. American Navy administration immediately following the war, concentrating on the "housekeeping aspects" of island government, saw to it that the islanders were fed and clothed, had health services and also began to provide them jobs. A definite "leadership vacuum" was generated, however, in those aspects of government so necessary in developing a healthy local economy.

The islands are strewn with abandoned sugar mills, fertilizer mines, power plants and thousands of acres of agricultural land, vacant since 1946. During this period the islanders tended to revert back to their traditional subsistence economy.

In more recent years, the Trust Territorial government has tried hard to influence change. Much has been done by the agricultural staff of the government. The basic ingredients of the program rely upon "free handouts" as incentives to agricultural production. The government provides the use of heavy equipment, land clearing, and the irrigation water at less than cost. Free seed and the use of free breeding animals are available on most islands. The government has even become the manager of their marketing and distribution system through the organization of

government-run "farmers' markets" through which fresh produce is funneled to the consuming public. Such service, along with some technical advisorship has begun to stimulate increased food production. It is felt, however, that sustained, long-term growth, will require more basic attitudinal changes. Following are listed conditions which strongly affect the islander's approach to commercial agriculture:

1. Strong family or clan social organizations which encourage the exchange of food, and hinder land development for individual gain.

2. The perception of money as a resource for obtaining short-term luxuries, but not as an investment resource for long-term gain. The fairly commonly accepted truism that an islander will work for one month in order to obtain money to buy an outboard motor, then quit work and go fishing, is not absolutely true. However, it does illustrate a general attitude which places lower value on conforming to a long-term work schedule.

3. Ready availability of government jobs.

4. Simple tastes, (particularly on the outlying islands) which are fairly easily satisfied without money.

5. Lack of education.

6. Low status of agriculture as a career among young people.

7. A commonly accepted diet made up to a considerable degree of local fruits and vegetables, which by tradition, are either grown in the backyard or are obtained through exchanges with friends or family. This places a limit to the amount of cultivated commercial vegetables and fruits which can be sold for money.

8. Lack of adequate information about the amount of produce which is planted and available for harvest.

9. Failure, until recently, to develop real leadership among the island people themselves, with the skills and attitudes so necessary to stimulate change. (Many Micronesians are working on jobs in the present agricultural programs, but in most cases they are only partially trained and they occupy the lowest and least responsible jobs, thus allowing them little chance to assume a leading role.)

10. A pervasive antipathy for vegetables and fruits most commonly cultivated commercially. Dietary habits are changing, however, as evidenced by the gradual increase in production and sale of cucumbers and melons.

11. Poor transportation systems for agricultural products, both between islands and upon islands.

What Can Be Done?

Recognizing the fact that the people of the Pacific Islands will be forced, by the changing (and increasingly smaller) world, to live in a money economy and to become more self supporting, we look to commercial agricultural production as one of the sounder alternatives. Along with this, people will, of course, need other knowledge and skills if they are to make the change easily. These include a wide range of subject areas from human nutrition to market organization.

In discussing the possibility of economic development, people on each of the islands verify their need for further technical support including, but not limited to soil classification, crop production statistics, public health information and production capital.

But the primary concern expressed in this paper is that in whatever education or technical program the people in the target audience should be the first consideration.

The needs of a farmer, or for that matter a rural family, on Ponape or Majuro are going to be decidedly different from the needs of a farmer in Iowa or Nevada. The resources they can put together, including land, equipment, capital and market services will be different. Both the laws and the traditions about land ownership are so different as to cause great frustration among mainland authorities working there.

A knowledge delivery system as well as a technical support system will be frustrated unless it is designed to work within the social, political and economic milieu of the locality.

The list of "conditions" found in the previous section sound like obstacles when viewed from the standpoint of a Nebraska County Agent or SCS technician. Most of them can also become assets if the program is built to serve the needs of the local people. The first priority of any such endeavor among the Pacific Islands should be to develop (and rely upon) local leadership. These should be developed through formal (degree) education, through in-staff training and supervision and through proper salary recognition. Research and training back-up should be provided by close institutions such as the University of Hawaii and University of Guam. Collaborative support should be provided in preparing "local language" publications and training aids. Until that is done, the outside authorities will be regarded as the "caretakers" and the island people will, at best, consider themselves our wards.

TRUST TERRITORY OF THE PACIFIC ISLANDS

OPERATIONS PLANNING WORKSHEET
(Dollars in Thousands)

Headquarters Dept., Office or
District R&D
Activity Agric. TT-wide
Date 1/27/75

CODE		1975	1976	1977
11-1	Stateside Employees (positions/$)	6/$133.4	6/$135.9	4/$ 81.2
11-2	Micronesian Employees (positions/$)	38/$124.5	36/$111.8	37/$135.7
12	Personnel Benefits	10.3	10.7	7.8
21-2	Recruitment, etc.	12.0	13.2	8.8
	Total-Personnel	44/ 280.2	42/ 271.6	41/ 233.5
X	All others (Petroleum, insecticides, tools, travel) (POL - non add)	141.0	130.3	132.8
Less				
90	Refunds and Reimbursements	(55.6)	(55.6)	(20.0)
	Total - All Others	85.4	74.7	112.8
GRAND TOTAL		365.6	346.3	346.3

APPENDIX B

TRUST TERRITORY OF THE PACIFIC ISLANDS

OPERATIONS PLANNING WORKSHEET
(Dollars in Thousands)

Headquarters Dept., Office or
District PALAU
Activity Agriculture
Date 1/31/75

CODE		1975	1976	1977
11-1	Stateside Employees (positions/$)	1/21.1	1/21.7	1/22.8
11-2	Micronesian Employees (positions/$)	36.120.4	36/126.9	36/133.2
12	Personnel Benefits	3.1	3.2	3.7
21-2	Recruitment, etc.	2.0	2.2	2.2
	Total-Personnel	37/146.6	37/154.0	161.9
X	All others (Petroleum, insecticides, tools, travel) (POL - non add)	31.6		
Less				
90	Refunds and Reimbursements			
	Total - All Others	31.6	29.6	36.5
GRAND TOTAL		178.2	183.6	198.4

TRUST TERRITORY OF THE PACIFIC ISLANDS

OPERATIONS PLANNING WORKSHEET
(Dollars in Thousands)

Headquarters Dept., Office
or
District KUSAIE
Activity Agriculture
Date 1/31/75

CODE		1975	1976	1977
11-1	Stateside Employees (positions/$)	1/20.0	1/20.5	1/21.5
11-2	Micronesian Employees (positions/$)	6/15.1	6/16.0	6/16.8
12	Personnel Benefits	1.6	1.7	1.8
21-2	Recruitment, etc.	2.0	2.2	2.2
	Total-Personnel	7/38.7	7/40.4	7/42.3
X	All others (Petroleum, insecticides, tools, travel) (POL - non add)	9.3	10.3	7.0
Less				
90	Refunds and Reimbursements	-0-	-0-	-0-
	Total - All Others	9.3	10.3	7.0
GRAND TOTAL		$ 48.0	$ 50.7	$ 49.3

TRUST TERRITORY OF THE PACIFIC ISLANDS

OPERATIONS PLANNING WORKSHEET
(Dollars in Thousands)

Headquarters Dept., Office or District: PONAPE
Activity: Agriculture
Date: 1/31/75

CODE		1975	1976	1977
11-1	Stateside Employees (positions/$)	2/ 31.0	2/ 33.4	2/ 35.1
11-2	Micronesian Employees (positions/$)	48/156.5	48/165.0	48/170.2
12	Personnel Benefits	4.4	4.4	4.4
21-2	Recruitment, etc.	4.0	4.4	4.4
	Total-Personnel	50/195.9	50/207.2	50/214.1
X	All others (Petroleum, insecticides, tools, travel) (POL - non add)	43.9	59.5	60.9
Less				
90	Refunds and Reimbursements	-0-	-0-	-0-
	Total - All Others	43.9	59.5	60.9
GRAND TOTAL		$ 239.8	$ 266.7	$ 275.0

TRUST TERRITORY OF THE PACIFIC ISLANDS

OPERATIONS PLANNING WORKSHEET
(Dollars in Thousands)

Headquarters Dept., Office
or
District Marianas
Activity Resources & Development
Date 1/31/75
Account No. 2.511

CODE		1975	1976		1977
11-1	Stateside Employees (positions/$)	2/ 40.9	2/ 41.6		2/ 43.7
11-2	Micronesian Employees (positions/$)	64/189.4	64/198.0		64/207.9
12	Personnel Benefits	5.6	5.9		6.2
21-2	Recruitment, etc.	4.0	4.4		4.4
	Total-Personnel	66/239.9	66/249.9		66/262.2
X	All others (Petroleum, insecticides, tools, travel) (POL - non add)	161.8	182.6	1/	193.3
Less					
90	Refunds and Reimbursements	(25.0)	(25.0)		(25.0)
	Total - All Others	136.8	157.6		168.3
GRAND TOTAL		376.7	407.5		430.5

1/ $10,700 added for equipment purchases.

TRUST TERRITORY OF THE PACIFIC ISLANDS

OPERATIONS PLANNING WORKSHEET
(Dollars in Thousands)

Headquarters Dept., Office
or
District Truk
Activity Agriculture
Date 1/31/75

CODE		1975	1976	1977
11-1	Stateside Employees (positions/$)	1/19.3	1/19.3	1/20.2
11-2	Micronesian Employees (positions/$)	32/83.3	33/87.9	33/90.2
12	Personnel Benefits	2.5	2.6	3.0
21-2	Recruitment, etc.	2.0	2.2	2.2
	Total-Personnel	107.1	112.0	115.6
X	All others (Petroleum, insecticides, tools, travel)	29.3	27.1	29.4
	(POL - non add)	(3.7)	(3.6)	(3.0)
Less				
90	Refunds and Reimbursements			
	Total - All Others	29.3	27.1	29.4
GRAND TOTAL		136.4	139.1	145.0

TRUST TERRITORY OF THE PACIFIC ISLANDS

OPERATIONS PLANNING WORKSHEET
(Dollars in Thousands)

Headquarters Dept., Office or
District Yap
Activity Agriculture
Date 1/27/75

CODE		1975	1976	1977
11-1	Stateside Employees (positions/$)	-	-	-
11-2	Micronesian Employees (positions/$)	20/57.8	20/60.3	20/63.3
12	Personnel Benefits	.9	.9	.9
21-2	Recruitment, etc.	-	-	-
	Total-Personnel	20/58.7	20/61.2	20/64.2
X	All others (Petroleum, insecticides, tools, travel) (POL - non add)	19.5	16.3	16.0
Less				
90	Refunds and Reimbursements	-	-	-
	Total - All Others	19.5	16.3	16.0
GRAND TOTAL		20/78.2	20/77.5	20/80.2

TRUST TERRITORY OF THE PACIFIC ISLANDS

OPERATIONS PLANNING WORKSHEET
(Dollars in Thousands)

Headquarters Dept., Office or District: Marshalls
Activity: R&D - Agriculture
Date: 1/31/75

CODE		1975	1976	1977
11-1	Stateside Employees (positions/$)	1/15.6	1/	1/17.4
11-2	Micronesian Employees (positions/$)	26/75.2		27/86.0
12	Personnel Benefits	1.8		2.0
21-2	Recruitment, etc.	2.0		2.3
	Total-Personnel	94.3	102.8	108.3
X	All others (Petroleum, insecticides, tools, travel) (POL - non add)	26.3	29.0	29.2
Less				
90	Refunds and Reimbursements			
	Total - All Others	26.3	29.0	29.2
GRAND TOTAL		120.6	131.8	137.5

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
West Regional Technical Service Center
511 N. W. Broadway, Room 209
Portland, Oregon 97209

January 29, 1973

Honorable John M. Haydon
Governor of American Samoa
Pago Pago, American Samoa 96799

Dear Governor Haydon:

I wish to express my appreciation for the opportunity to provide technical assistance and resource condition data for your new taro project and to consult on other resource problems. The hospitality and arrangements provided by you and your staff were outstanding. I am very appreciative of the helpfulness and cooperation of Lt. Governor Frank Mockler and Director of Agriculture Pemerika Tauiliili. In addition to the assistance provided by these men, much of the success of my trip was due to the enthusiastic help of Mr. Maina Atafua, Farm Superintendent. Outstanding hospitality was provided by Chief Tofele, my host while on the island of Tau. To all the above-mentioned persons I extend sincere thanks for assistance willingly given.

My participation in American Samoa started Thursday, December 14, and terminated Thursday, December 21. My activity included field evaluation of soil resources along the new access road on Tau, the Atauloma and Taputimu Experiment Farms, and in the Aolaufou area on Tutuila. Evaluations were also made at a sanitary landfill site and at the pasture development on the FAA lands. Conferences were held with Lt. Governor Frank Mockler, Director of Agriculture Pemerika Tauiliili and other members of your staff. I regret that the summary conference with you was cut short by your illness.

My report will discuss soil resources of Tau and Tutuila in separate sections. I have also included some topics requested by Lt. Governor Mockler that were discussed at the staff conference.

Soils on Tau

Soils were examined along the new access road starting at the demonstration farm elevation of 300 feet and extending to the end of the road at an elevation of 1900 feet. Profiles were examined at frequent intervals in the freshly cut roadbanks. Several pits were also dug at the demonstration farm. Three different kinds of soil were observed along the transect in association with stringers of thin-bedded olivine basalt pahoehoe flows. The soils are provisionally classified, following the Soil Taxonomy of the United States, as members of great groups of Humitropepts, Hydrandepts and Tropofolists.

They will be discussed in this order. Soil samples were obtained for laboratory characterization, and when the data are available any needed adjustment in the classification of the soils will be made.

Humitropepts

These soils extend upslope from about 160 feet to approximately the 400 ft. elevation. They occur on what the geologists call the Tunoa Formation and appear to have developed in deeply weathered olivine basalt with a modest influence from volcanic ash. These soils are associated with pahoehoe flows having well preserved ropy surfaces. A few low cinder cones were observed at a distance so it is entirely possible that there will be associated areas mantled with ash or cinders.

The topographic map indicates that about 360 acres of the Tunoa Formation have slopes favorable for agricultural development. Projecting from the transect observations, I estimate that approximately 40 percent of the area, or 160 acres, consists of Humitropepts. Of course a detailed soil survey would show accurately the extent of different kinds of soils. The Humitropepts have developed under about 175 to 200 inches of rainfall annually. The least wet months are normally June, July and August. Information received from the National Oceanic and Atmospheric Administration indicates that seasonal rainfall may vary widely in individual years, and rainy periods can occur any month. Short time data obtained from NOAA for Luma Village showed the following:

Rainfall (inches)

	1969	1970	1971	1972
Jan.		11.20	15.6	
Feb.		11.67	23.6	
March		17.61	7.56	
April		10.37	6.99	
May		11.26	5.4	11.0
June		14.01	10.2	6.5
July		11.33	3.9	4.5
Aug.		19.61	10.4	4.2
Sept.	5.24	34.30	5.4	
Oct.	15.75	9.55	4.17	
Nov.	19.78	6.78	14.9	
Dec.	23.03	31.54	9.0	

The above data demonstrate how variable the rainfall can be. This will certainly be an important consideration in the taro project. I recorded a soil temperature of 79° F. at a depth of 20 inches on December 16. The NOAA indicated a 3° difference between winter and summer air temperatures. This indicates a soil temperature range of 76° and 79° F., a range that is suitable for taro.

The soils in the Humitropept group have dark reddish brown fine-textured permeable surface soils with strong blocky structure. The subsoils are of similar color, fine-textured, with blocky structure, and are sticky and plastic when wet. These soils are well drained and are adapted for growing taro. However, precautions will need be taken to use proper methods in land preparation and to follow suitable farming techniques to maintain fertility. The natural fertility of these soils is closely associated with the topsoil and even this will rapidly deteriorate unless a good management program is used. Removal of topsoil can be very detrimental unless a special conditioning program is used. Low rainfall will depress yields in some years. But by planting to avoid the dry months and by utilizing a short-term crop the problem can be minimized except in extremely dry years.

Taro plantings on this kind of soil in the Tau demonstration farm exhibited a very uneven growth. Some areas of the three-months' old planting are 32-36 inches tall, whereas in adjacent areas the plants are only 12 to 15 inches high. It was suggested that uneven application of fertilizer was responsible. However, the growth pattern did not support this explanation. An examination of these areas strongly suggested that land smoothing, resulting in the removal of topsoil in some areas, caused the problem. The areas of poor growth correlated very closely with the areas from which the original topsoil had been removed, leaving the subsoil at the surface. Depressed growth was undoubtedly caused by a combination of a poor rooting medium (compacted subsoil) and deficiency of nutrient elements, especially phosphorus. Any operation that removes the topsoil should be followed by addition of organic matter and a complete fertilizer. Work on similar soils in Hawaii indicates that a satisfactory yield can be had with applications of 250 lb. N + 250 lb. P + 250 lb. K/ac. in upland taro. If the topsoil has been removed an additional 200 lbs. of P should be added in the first application. In future land clearing and preparation the disturbance of the topsoil should be kept to the lowest minimum possible.

The soils in the Humitropept group have soil properties favorable for engineering uses such as the use of the soil as structural materials or as foundation material upon which structures are built. All features are favorable for road location and foundations for low buildings.

Permeability is moderately rapid. Runoff is slow, and erosion hazard is slight on slopes of 0 to 7 percent gradient and moderate on slopes as much as 15 percent.

Hydrandepts

These soils are at the top of the terrace escarpment at the 500 ft. elevation and were observed at the end of the road at the 1900 ft. elevation. Undoubtedly they extend to much higher elevations. They are associated with stringers of Tropofolists and olivine basalt pahoehoe flows. These soils are developed on what the geologists call the Post-Caldera Formation. This formation is characterized by interbedded pahoehoe and aa flows associated with numerous vents. The access road truncates an area in which there are many vents that undoubtedly were responsible for depositing a mantle of ash and cinders in the vicinity of the road. A survey would need be made to determine accurately the extent of the ash.

The Hydrandepts that we examined had developed in volcanic ash. They are characterized by dark brown surface soils that are nonsticky and nonplastic and have moderate subangular blocky structure, and dark reddish brown subsoils that have moderate prismatic structure, and are nonsticky and moderately smeary. They are strongly weathered soils, and have low bulk density. Similar kinds of soil in Hawaii have a high cation exchange capacity but a very low base saturation. These soils have a very high capacity to fix phosphate and are low in available calcium. It is estimated that they receive 200 to 250 inches of rainfall very evenly distributed. Soil temperature measured at the 1900 ft. elevation was 77° F. at 20 inches in depth. Soil temperatures are favorable for taro.

These soils are well adapted to taro production to the 1200 ft. elevation. Above this elevation the slope gradient becomes steeper and erosion will be a problem. Above the 1800 ft. level fog occurs daily and lack of sunshine will significantly reduce yields.

Special attention will need be given to supplying the needed phosphate and calcium. As was stated earlier these soils have a large capacity to fix phosphate. Experience on similar soils in Hawaii has indicated the need for an initial application of at least 500 to 600 lbs. of P/ac. the first year. Higher amounts may be needed. A fertilizer of 250 lb. N + 250 lb. P + 250 lb. K/ac. has given good results after the initial application of phosphate. Liming has been recommended for taro on this soil. Simple fertilizer trials using N, P and K singly, and in combination, would help establish the proper amounts to apply.

The soils in the Hydrandept group have unfavorable soil properties for engineering uses. They are poorly suited for use as a structural material or as foundation material upon which structures are built. They are characterized by poor workability, low bearing capacity, especially immediately after disturbance and high shrinkage on drying.

Permeability is moderately rapid. Runoff is slow and the erosion hazard is slight on slopes of 0 to 7 percent and moderate to slopes of 15 percent. The erosion hazard is high on slopes above 15 percent especially in disturbed areas. Severe erosion was observed on these soils along the new road construction. It is my opinion that the road will continue to gully and wash out unless adequate water control measures are installed.

Tropofolists

These soils occur as stringers associated with the Hydrandepts and possibly the Humitropepts although this latter relationship was not observed. These soils are characterized by a thin surface layer of organic matter derived from leaf litter twigs and branches resting on fragmental volcanic rocks with the interstices partially filled with organic materials. These are freely drained organic soils that are usually moist. These soils are not suitable for taro, because of the stones and rocks. They are suitable for crops such as bananas, papayas, coffee and coconuts.

The soils in the Tropofolist group have a very rapid permeability, slow runoff and the erosion hazard is slight. This soil is a very poor source of structural material and the very shallow depth to fragmental Aa lava will be a consideration when used as a structural base.

Paddy Soils in Vicinity of Luma Village

These soils were observed from a distance and discussed but not examined. Their location suggests that they developed in recent alluvium washed from the adjacent hills. These soils are presently being used largely for taro production. It was pointed out that there is not a good water control system. During the peak rainy periods these areas flood and at times inundate much of the taro. During the dry period the canal system is inadequate to distribute the water supply efficiently to all areas. The area is significant in extent and consideration should be given to development of an adequate water control system. There are several reasons why paddy culture is superior over upland culture and consequently may deserve priority of development.

1. Higher yields per unit area under irrigation.

2. Reliable yields--not variable according to rainfall.

3. Weed control is more effective under irrigation.

4. Crop can be ground stored thus extending growing season to accommodate labor supply and facilitate coordinating harvest with peak demand.

SOILS OF TUTUILA

Soils were studied and sampled at the Atauloma Experiment Farm, the Taputimu Experiment Farm, and in the Aolaufou Area. They were identified as members of the great groups of Tropohumults, Eutrandepts and Tropofolists and will be discussed in that order.

Tropohumults (Provisional Classification--laboratory data will be needed for final placement.)

These soils were studied on the Atauloma Experiment Farm. It is estimated that they receive approximately 200 inches of rainfall and normally have two dry months. Soil temperature was 79° F. at 20 inches depth. Data obtained from NOAA indicated that the average annual air temperature is near 80° F. June, July and August are the coolest months, and January, February and March the warmest. The mean annual range of air temperature is only about 3° F. Based on this information soil temperatures are favorable for taro.

These soils developed in weathered olivine basalt and are strongly leached. In the profile studied, the soil is characterized by a dark brown, friable, fine-textured surface layer. The subsoil is dark reddish-brown clay, has moderate subangular blocky structure and is sticky and very plastic.

These soils are suited to growing of taro and should give good yields if a program is followed to maintain the organic matter and fertility. It is especially important to avoid removing the surface layer and expose the clayey subsoil unless absolutely necessary. Exposure of the very fine-textured subsoil would result in adverse physical conditions for root development and a low level of fertility, especially in respect to phosphate. If the subsoil is exposed, large quantities of organic matter should be incorporated in the top 12-14 inches of soil and a complete fertilizer of 250 lb. N + 450 lb. P + 250 lb. K/ac. added. After the first year the phosphate can be reduced to 250 lbs./acre.

The soils in the Tropohumult group have favorable soil properties for engineering uses. They are well suited for use as structural material or as foundation material for roads or low buildings.

Permeability is moderate and runoff is medium. The erosion hazard would be slight to moderate.

Eutrandepts

Eutrandepts were observed at the Taputimu Experiment Station and in the Aolaufou Area. The soils at each area will be discussed separately.

The soils in the Aolaufou Area have developed in volcanic ash and cinders. They occur at an elevation of 800 to 1100 feet and receive in excess of 200 inches of rainfall annually. Soil temperature was measured at a 20-inch depth and was 75° F. This indicates an annual range of temperature from 72 to 75 or 76° F., which is quite satisfactory for taro.

In the profile studied the soil is characterized by dark brown, very friable, silt loam surface layer and dark brown very friable, blocky structured subsoil. Cinders lie at a depth of 25 inches.

These soils are well suited to growing upland taro. In consideration of the desirable physical features, the nearly continuous moist condition, and base status, these soils should have quite satisfactory yields if a program is followed that will maintain the organic matter and fertility. These should be among the best soils for upland culture of taro.

The Eutrandepts at the Taputimau Experiment Station have formed in pyroclastics. They are associated with flows of fragmental volcanic rocks in which organic matter has accumulated at the surface and in the interstices. These soils receive 125-150 inches of rainfall annually. The driest months are June through September. There are normally two months that moisture is limiting for taro culture. Soil temperature was 79° F. at a 20-inch depth on 12-9-72. The mean annual range of temperature is about 3° F. Soil temperatures are in the acceptable range for taro.

The profile examined 200 ft. north of the office complex was characterized by a very friable, dark brown loam surface layer and a reddish brown, very friable sandy loam subsoil. Soft laminated weathering tuff-sandstone lies at a depth of 40 inches.

These soils are suitable for taro culture but would be inclined to dry out rapidly during occasional periods without rain. Planting and harvest dates would need be carefully coordinated to avoid the dry periods. These soils have a high cation exchange capacity and high base saturation. A program that maintains the organic content and supplies 250 lb. N + 250 lb. P + 250 lb. K/ac. should be used. Repeated cropping without fertilization will markedly limit production.

A profile examined 250 ft. south of the office complex was only 25 inches to tuff-sandstone. Textures were approaching a loamy sand. These soils will have a marked tendency to become too dry during rainless spells.

The soils in the Eutrandept group have moderately favorable properties for engineering uses. They are suitable for use as structural material or as foundation material for roads or low buildings. They are characterized by moderate compressibility, low compacted density and moderate sheer strength. These soils are not well suited for septic tank filter fields because of lack of filter material.

Permeability is moderately rapid. Runoff is slow and the erosion hazard slight on nearly level slopes and moderate on steeper slopes.

PASTURE PROJECT - FAA AREA

The pastorial project was observed and the soils found to be Tropofolists. The profile examined is characterized by a thin layer of organic matter resting on fragmental volcanics with the interstices filled with organic matter. These soils are not suitable for taro but are suitable for crops as pasture, papayas, coconuts and coffee.

The present pasture vegetation is Californiagrass (Panicum purpurascens). Field records indicate that fertilizers have not been used. Pastures on similar soils in Hawaii fertilized with 100 lbs. N + 250 lbs. P + 80 lbs. K/ac. give satisfactory growth.

SANITARY LANDFILL (AIRPORT)

The sanitary landfill near the airport was examined and evaluated for potential use. The solid waste material is covered with several feet of cinders and the surface smoothed. With proper conditioning it should have a very good potential for pasture. The fill material should be relatively clean of weed seed. This material offers an opportunity to establish either Kikuyugrass (Pennisetum clandestinum) or Pangolagrass (Digitaria decumbens).

both of which are considered superior to Californiagrass (Panicum purpurascens). It is a practice to plant Intortum (Desmodium intortum), a legume, with the selected grass to supply nitrogen. An application of nitrogen-phosphorus fertilizer is generally needed to establish and maintain grass pastures. A phosphorus or phosphorus-potassium fertilizer is needed for an established grass-legume pasture. On similar soils in Hawaii fertilizer rates of 100 lb. N + 250 lb. P + 80 lb. K/ac. are used on grass pastures. The nitrogen is omitted on established grass-legume pastures. These rates have given satisfactory yields.

Other potential land uses are bananas, papayas and coffee. Crops that require frequent cultivation such as taro and vegetable crops are not well adapted. All adapted crops should respond well to a nitrogen-phosphorus-potassium fertilizer.

IMPLEMENTATION OF TARO PROGRAM

The plan for the Tau Taro Demonstration Project calls for training of the selected applicants before they start on their respective projects. This is to be accomplished by on-site training at the Tau Demonstration Farm using the local farm advisors as instructors. After contact with the designated instructors I seriously question that they themselves have had enough training in modern taro culture to qualify as instructors. As was brought out by the present demonstration work, and by remarks in conference, before these men can function as top instructors they need intensive training in: (1) land preparation, (2) variety selection, (3) fertilization, and (4) weed control. Inadequate training of the farmers will possibly result in a significant financial loss, in addition to personal hardships.

Dr. D. L. Plucknett, Agronomist, College of Tropical Agriculture, University of Hawaii, Honolulu, Hawaii, has headed up the taro research in Hawaii for a number of years. He has also provided guidance to the agronomic program in Western Samoa for several years. He is recognized as one of the leading authorities on taro culture in the world and is an excellent instructor. I strongly recommend that you obtain the assistance of Dr. Plucknett to give an intensive training program to your instructors. Two weeks should be adequate to accomplish the initial training of the instructors in modern taro culture. A request for his assistance should be directed to Governor John A. Burns of Hawaii.

An inventory of resource data available in American Samoa showed the availability of topographic and geology maps for Tutuila and the Manua Islands. Air photo coverage at 1:20,000 is also available. Unfortunately no soil resource data is available.

I discussed at some depth with Lt. Governor Mockler and other staff members the value of a soil survey in guiding programs such as the taro project.

Soil surveys are a very important tool in land use planning in which policies and programs are developed that influence the use of land in communities where land is to be developed, or where different uses compete for available space. Soil surveys provide decision makers with soil resource data and help them in making meaningful decisions.

The historic purpose of soil survey has been the improvement of agriculture. However, the same principles of soil interpretations that are used in agriculture can be applied to many other uses, such as broad land use planning, site selection for urban development, etc. Increasingly, tax assessments are based on soil surveys with adjustments for the nonsoil factors that contribute to the value.

The fundamental purpose of a soil survey is to provide a basis for making predictions. A soil survey includes the examination and classification of soils in the field, location of soil boundaries, plotting of the soil boundaries on a base map, description of the soils shown by the map, including the morphology and statements about important properties and qualities, and finally interpretations of the map units for the intended purposes of the survey and publication of the soil survey.

Soil surveys can be made at different levels of detail depending on purposes of the survey and nature of the area. As Lt. Governor Mockler suggested, it is not necessary to make the same kind of soil surveys on the very steep uplands where land use will probably remain at low intensity and on the gently sloping low terrace areas favorable for development.

Detailed soil surveys are the most intensive and show the greatest amount of detail. Soils in each delineation are identified by direct field examination and the surveys have a high level of reliability for detailed planning. They are appropriate for intensive planning such as predicting specific uses and treatment of small tracts of land.

A detailed soil survey for American Samoa would cost about $75,000.

Reconnaissance soil surveys are made at smaller scales than detailed surveys and do not show so much detail. They show in a general way where different kinds of soils are located. They are useful in broad planning.

Reconnaissance soil surveys show relatively large and distinct areas described in terms of the component soils, their relative proportions and their pattern of distribution. Reconnaissance soil surveys, like detailed soil surveys, make an inventory of basic soil resources of an area. The reconnaissance mapping units usually contain two or more contrasting kinds of soils that occur as distinctive landscape patterns. Reconnaissance soil surveys are usually suitable for areas where present use is of low intensity and is expected to remain so. Some are made in areas currently under extensive use to locate areas of soil suitable for development in intensive use. Detailed surveys are then made on these areas as needed. Reconnaissance soil surveys

are also made as a guide for advisory programs where detailed surveys are needed but cannot be made with existing resources in the immediate future. Selected areas can be remapped at a later date in more detail.

A reconnaissance soil survey for American Samoa would cost about $50,000.

The two kinds of soil surveys, detailed and reconnaissance, may be made on different parts of the same soil survey area, depending upon the need for detail. This may be the system that would be best adapted to American Samoa.

Commonly the user of soil surveys wants to know how the soils on a tract of land can be expected to behave. Predictions of soil behavior under stated conditions are called "soil survey interpretations." These interpretations indicate the reasonable alternatives for soil use and management and the expected results. Reliable interpretations result from a synthesis of basic data about the soils themselves, obtained from field and laboratory research, field experiments, and the experience of users of soils, especially farmers, ranchers, foresters, and engineers.. Soil survey interpretations may be presented on maps or in tables.

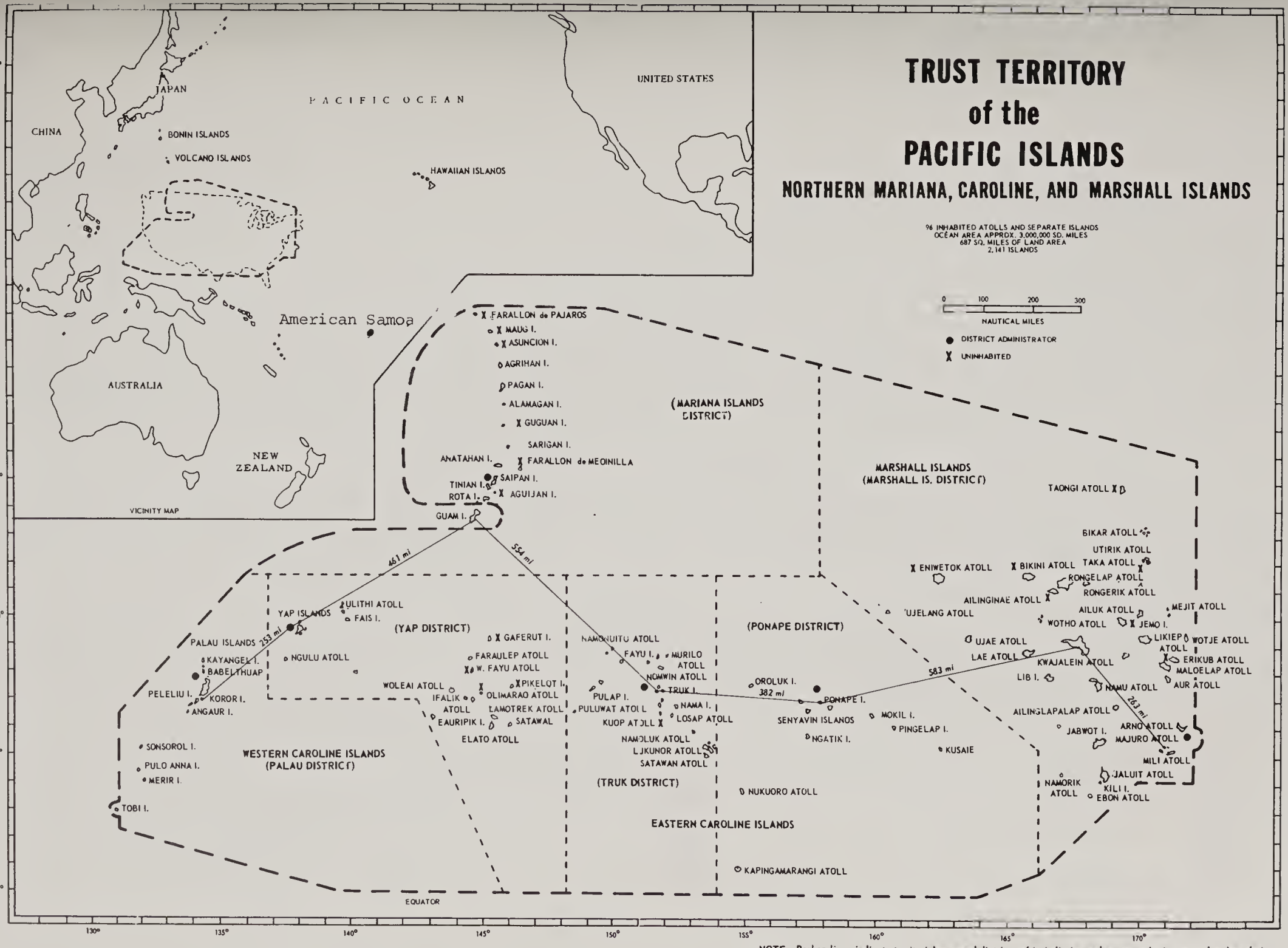
Interpretative soil groupings are devices for generalizing and presenting interpretations. Beginning with tables giving separate predictions for each kind of soil, one can group all of the soils of an island or larger area into three, five, or some other number of classes, depending on the detail needed, according to some one quality, such as erodibility, suitability for taro under a defined system of management, and so on. Such groupings are a simple way to present interpretations that show easily how one kind of soil compares with another, but detail is lost in the process. To serve the needs of various users we make all sorts of interpretations, both specific and general. Each interpretation scheme must be designed for its unique purpose with the greatest possible simplicity of expression. Thus, the basic soil survey, in which all the different kinds of soils are named and classified, provides the means for extending the results of research and experience. These basic soil surveys with their several interpretations are invaluable background for land use studies and the development of land-use plans.

Contract arrangements can be made with the Soil Conservation Service for soil surveys. If you decide to implement a contract for soil surveys, please contact Mr. William M. Johnson, Deputy Administrator for Soil Survey, Soil Conservation Service, Washington, D. C. 20250.

At Lt. Governor Mockler's request I am attaching the document, "A Standard State Soil Conservation District Law." This gives information on how Soil and Water Conservation Districts are formed. Additional information may be obtained from Mr. Kenneth E. Grant, Administrator, Soil Conservation Service, Washington, D. C.

Sincerely,

J. Melvin Williams
Principal Soil Correlator
Attachment



NOTE: Broken lines indicate territorial area and districts of jurisdiction and are not to be interpreted as boundaries.